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The Feeding and Grooming Habits of the Galago.

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(Plate I).

The peculiar arrangement in the lemur group of the six front teeth of the lower jaw, popularly known as the "tooth-comb," has long been considered a grooming apparatus with which the lemur combs his thick fur. These teeth, two pair of incisors flanked by two modified canines, project almost horizontally beyond the abbreviated lower jaw and form what seemed to be an ideal comb.

Dr. M. Russell Stein, in an article entitled "The Myth of the Lemur's Comb," (1936) challenges this long accepted theory. After observation of captive lemurs in the New York Zoological Park and a study of specimens which had died recently he came to the conclusions that (1) this incisor-canine complex is not a comb because the tips of the teeth converge so closely that fur cannot pass between them; (2) the tooth formation takes no part in the grooming operation so characteristic of the lemuroids. He suggests that the function of these teeth is probably that of cutting leaves and fruit, though he offers no evidence to substantiate his suggestion.

My contribution to this question of the use of the specialized teeth in feeding and grooming is based on observations of a galago, one of the African lemuroids. Though not a true lemur, the galago is closely related, and has the same tooth-complex and feeding habits as the Madagascan lemurs. My notes, therefore, have a definite bearing on the question of the use of the incisor-canine complex in the group as a whole.

In Africa, in 1936, I procured from a native in Mombasa a young, tame, *Galago crassicaudatus*. He was about the size of a small gray squirrel, with thick gray fur frosted over with light buff on the back; the ventral surface was almost white with buff on chest and sides of the legs. He was strictly an arboreal type, with hind legs much longer than his fore legs. The hind feet, more specialized than those of the lemur, were disproportionately long and gave adequate leverage for his huge leaps. The big toe, set apart and apposed to the others, also made the hind foot a powerful grasping structure. All the digits had flat, concave tipped (Hayman) nails with the exception of the index toe which bore the pointed claw characteristic of Lemuroidea. He possessed other features typical of the lemurs such as the long, thin tongue used for lapping and licking; the pointed nose with crescent-shaped nostrils extending beyond the lower jaw with its incisor-canine complex and canine-like first premolar. On the upper jaw were two pairs of small incisors and conspicuous canines. The galago tooth structure differs from that of the lemur in that (1) the first premolar of the lower jaw, though long and sharp, is not quite so caniniform as that of the lemur; (2) the molars of the galago have better grinding surfaces; (3) the last premolar of the upper jaw is more molarized. (Le Gros Clark).

The animal whose feeding and grooming habits I have studied was with me for fourteen months, until he made his escape into the tree-tops of the Connecticut hills. During this time he had complete freedom of action within the confines of the house and screened-in porch. He slept all day in some dark, high spot, with neck arched and head tucked between his hind legs. He became active at dusk and in the intervals between jumping, feeding or grooming he would look to me for companionship. He seemed to enjoy being fondled. He would jump from a curtain rod to my shoulder or drop from the top of the door into my lap, demanding attention by nibbling my fingers. I make these statements at this time in order to show how completely at home the animal seemed to be and how simple a task it was to make observations at close range.

FEEDING HABITS.

The galago is an omnivorous feeder though he much prefers insects. Each evening during the summer months I set loose on the screened-in porch a dozen or more grasshoppers and moths. With eyes focussed intently the galago would watch, then leap to a perch close to the insect, grab it with one or both hands and put it in the side of the mouth. Jumping to a more comfortable perch he would sit like a squirrel holding the morsel in his hands while he consumed it with relish. He discarded wings and used his tongue to shove them out over the "comb," which thus appeared to be passively used as a trough. He ate everything but the wings, beginning at the head, chewing vigorously.

I also placed on a shelf each evening an assortment of food which included cut up bits of raw vegetables, fruit, bread and milk in a shallow dish to which I frequently added cod liver oil and now and then a little sugar. At intervals he would help himself, lapping up the milk with his long tongue, keeping his projecting nostrils out of the milk with difficulty. Other food he smelled carefully; if acceptable he would take a small piece directly into his mouth, jump away, and holding it in his hands, bite off what he wanted, using the upper canine against the caniniform first premolar of the lower jaw. As an animal in captivity eats what is provided for him, it is obvious that one cannot determine in what ways he might normally extend his diet. This galago once astonished me by leaping to my shoulder with a half consumed young mouse in his hands. I never saw him use the incisor-canine complex for seizing food. This does not mean that he could not do so. It may be, of course, that the type of food which would call for the use of this device was never offered to him. I am now making a study of the habits of a family of *Galago maholi* A. Smith, and I hope to have further observations to offer on feeding habits in this group.

It is well known that lemuroids are more primitive than the monkeys. Despite the fact that they are usually arboreal they still depend on their sense of smell as well as on their vision. The galago exemplified this by letting his nose tell him what he needed to know. He always cautiously smelled his food, except when it was food-on-the-wing; then he would grab first and smell afterwards. It was his sense of smell too that warned him not to land on a hot radiator or stand-pipe. I have watched him deliberately smell these surfaces.

GROOMING.

Although F. Wood-Jones (1929) and S. Zuckerman (1933) reaffirm the conclusion of earlier writers that the procumbent front teeth of the lower jaw are used in grooming the fur, Dr. Stein states that the captive lemurs in the New York Zoological Park groom themselves by the exclusive use of the index-toe claw and the tongue. He denies that the lower jaw teeth are employed in this operation. He further states that 85% of the entire groom-

ing time the lemur makes use of his index-toe claw, while the tongue completes the process. The grooming habits of the galago seem to be quite different. I find that (1) he does use the tooth complex, not, however, as a comb but as a scraper; (2) the tongue is used in grooming as in the case of the lemur; (3) the claw is not regularly employed as a grooming implement but only occasionally for scratching an irritated or otherwise inaccessible spot.

When the galago first awoke he would stretch his muscles and begin his toilet by scraping his fur. As in the true lemurs the individual teeth are probably not separated sufficiently at their tips to allow the fur to be pulled through them (Stein); scraper is, therefore, a better term than comb (Plate I). With this implement he would dig down to the integument, which he would scrape as well as his fur. I had frequent proof of this scraping action, when, as though I were a fellow galago, he would perch on my arm or hand and vigorously dig into my integument with this scraper. The intensity of the scraping made it clear that any dead skin or foreign objects lodged in the heavy pelt of the galago could be effectively removed in this way. After his energetic use of the scraper he would finish me off with a gentle but thorough licking with his long tongue, the same process with which he finished his own toilet.

Although I did not use a stop watch I saw repeatedly, at close range, scraper and tongue perform the operation of dressing the fur, briefly and with relative frequency; and I saw the claw used only in scratching, now and then. After scratching, the galago cleaned his claw by putting it in the side of his mouth.

Since the grooming habits of the galago seem to differ from those of the true lemur as recorded by Dr. Stein, it might be profitable if studies of other lemuroids possessing this scraper were made.

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EXPLANATION OF THE PLATE.

Fig. 1. Lower jaw of *Lemur catta*. $\times 2$.

Fig. 2. Lower jaw of *Galago* (sp?). $\times 2$.

(Photographs from material in The American Museum of Natural History).